Two new species of *Acacia* (Leguminosae: Mimosoideae) from the Koolanooka Hills in the northern wheatbelt region of south-west Western Australia

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Abstract

Maslin, B.R. & Buscumb, C. Two new species of *Acacia* (Leguminosae: Mimosoideae) from the Koolanooka Hills in the northern wheatbelt region of south-west Western Australia. *Nuytsia* 17: 253–262 (2007). The following two new species of *Acacia* from the Koolanooka Hills, a low banded ironstone range in the northern wheatbelt region of south-west Western Australia (east of Morawa), are described: *Acacia graciliformis* Maslin & Buscumb and *Acacia muriculata* Maslin & Buscumb. Both are listed as Priority One species according to the Department of Environment and Conservation's Conservation Codes for Western Australia Flora.

Introduction

The Koolanooka Hills are located east of Morawa in the northern wheatbelt region of south-west Western Australia, within the species-rich Transitional Rainfall Zone (Hopper 1979), close to the border of the agricultural and pastoral zones. They occupy an area of about 3500 hectares of relatively undisturbed vegetation but are surrounded by a landscape that has been extensively cleared for agriculture. The Koolanooka Hills comprise a series of low, steep-sided, linear ridges of Banded Iron Formation (BIF) and form part of the larger Koolanooka synform (Baxter & Lipple 1985; Beard 1976). The Perenjori Hills located 10 km further south are part of this same geological structure but their vegetation communities are more degraded than those of the Koolanooka Hills. As noted by Maslin & Buscumb (2007, this issue), many BIF ranges have potential conservation value as they may contain a range of geographically restricted plant taxa and communities.

The Department of Environment and Conservation (DEC) recently initiated a Biodiversity Conservation Initiative (now called 'Saving Our Species') project aimed at researching the flora and vegetation of BIF ranges. The first phase of this project was a three year study of the flora and vegetation of BIF ranges on the Yilgarn Craton, one of which is the Koolanooka Hills and the nearby Perenjori Hills (Meissner & Caruso, in review). This survey identified a number of endemic species and species of special interest, including the two new species of *Acacia* Mill. that are described below, both of which have been recently listed as Priority One species on DEC's Declared Rare and Priority Flora List. The first of these, *A. graciliformis* Maslin & Buscumb (referred to as '*A.* aff. *declinata*' in Meissner & Caruso, in review) had previously been collected only once and the second, *A. muriculata*

Maslin & Buscumb (called '*Acacia* sp. Koolanooka falcate' in Meissner & Caruso, in review) was collected for the first time during the survey. Historically, the northern area of the Koolanooka Hills was mined for iron ore (Baxter & Lipple 1985) and there is current interest in exploring the future mining potential of the area. Currently none of the area is reserved (Meissner & Caruso, in review), however, the plant assemblages of the Koolanooka Hills (Beard 1976) have been formally endorsed as a threatened ecological community.

New taxa

Acacia graciliformis Maslin & Buscumb, *sp. nov.*

Fruticuli 1–2 m alti. *Ramuli* ad extremitates subtiliter adpresse-puberuli, mox glabri. *Phyllodia* brevia, gracilia (7–25 mm longa, 0.7–1 mm lata), teretia sed in sicco sub-teretia vel compressa, vadose vel moderate recurva, rigida, pungentia, ± glabra, nervis longitudinalibus 9–10. *Inflorescentiae* simplices; *pedunculus* brevis (3–5 mm ubi florens, ad 9 mm in fructu), glaber; *capitula* globularia, parva (3–4 mm diam. in sicco), pallido aurea, 11–18 -flora. *Flores* 5-meri; sepala libra vel fere libra. *Legumina* (valvae dehiscentia et legumina immatura observata) 3–3.5 mm lata, firme chartacea, moderate ad valde curvata, glabra. *Semina* in legumentes longitudinalia disposita.

Typus: Koolanooka Hills, east of Morawa, Western Australia [precise locality withheld for conservation purposes], 13 September 2006, *B.R. Maslin* 9100 (*holo*: PERTH 07523882; *iso*: CANB, K, MEL, NSW, NY, PERTH 07489315).

Acacia aff. *declinata* (*Meissner & Caruso* 52), Meissner & Caruso (in review).

Photographs. WorldWideWattle [online at www.worldwidewattle.com].

Openly branched, spreading *shrubs* 1–2 m tall, main stems slender and somewhat contorted. *Bark* grey, finely longitudinally fissured on main stems, smooth or sub-smooth on upper branches. *Branchlets* terete, obscurely ribbed (ribs almost evident immediately below insertion of phyllodes on young branchlets but not evident on mature branches), finely appressed-puberulous at extremities (the hairs small, appressed, straight to shallowly incurved and densest at new shoots), soon glabrous. *Stipules* caducous or sub-persistent, inconspicuous, triangular, *c.* 0.5 mm long. *Phyllodes* inserted on raised stem projections (which persist on branchlets after phyllodes have fallen off), terete when fresh but sub-terete to compressed when dry, 7–25 mm long, 0.7–1 mm wide, shallowly to moderately recurved, rigid, glabrous or sometimes very sparsely appressed-hairy especially at the base near pulvinus, stomata evident (at ×10 mag.) between the nerves; with 9 or 10 distant *longitudinal nerves*, when phyllodes are compressed there are 3 nerves on each face, 1 along the lower margin and 2 along the upper margin flanking the gland (often an additional nerve is located between the two flanking nerves that extends from the gland to the pulvinus and sometimes also above the gland toward the phyllode apex but not quite reaching it), nerves yellowish and slightly raised when dry; *apices* gradually or ± abruptly narrowed to a straight, brown, rigid, pungent point to 1 mm long; abruptly contracted at base to a short, finely wrinkled (when dry), yellowish *pulvinus* which is slightly flared at base and often appressed-hairy adaxially. *Gland* situated on upper edge of phyllode near the middle (4–10 mm above the pulvinus), rarely a second gland present on few phyllodes, not prominent, yellowish. *Inflorescences* 1 or 2 per axil, simple; *peduncles* 3–5 mm when in flower, longer when in fruit (to 9 mm), glabrous; *basal peduncular bract* single, early caducous, cucullate and ± obtuse, *c.* 1.5 mm long, brown; *heads*

globular, 3–4 mm in diam. when dry, light golden, 11–18-flowered. *Bracteoles* narrowly spathulate, 1.5 mm long, claws linear, the laminae about equal in length to claw, light brown, shallowly concave and puberulous abaxially and along margins. *Flowers* 5-merous; *sepals* 2/5–1/2 the length of petals, free or almost so, narrowly oblong, sparsely hairy; *petals* 1.3 mm long, nerveless, glabrous. *Pods* (dehisced valves and immature pods seen), narrowly oblong to linear, slightly raised above seeds and not constricted between them, 3.5–6.5 cm long, 3–3.5 mm wide, firmly chartaceous, moderately to strongly curved (sometimes into an open circle or coil), ± twisted following dehiscence, glabrous (except sometimes very sparsely appressed-hairy on immature pods), brown, apex acuminate, slightly rounded; *marginal nerve* discreet and yellowish. *Seed* (1 only attached to dehisced valve), longitudinal in pod, obloid-ellipsoid, compressed, 3 mm long, 1.7 mm wide, glossy, dark brown; *pluerogram* 'u'-shaped with opening toward the hilum; *areole c.* 0.3 mm long, *c.* 0.2 mm wide; *funicle* expanding into a well developed membranous white *aril*. (Figure 1)

Characteristic features. Openly branched, spreading *shrubs* 1–2 m tall, the main stems slender and somewhat contorted. *Branchlets* finely appressed-puberulous at extremities, soon glabrous. *Phyllodes* short and slender (7–25 mm long, 0.7–1 mm wide), terete but drying sub-terete to compressed, shallowly to moderately recurved, rigid, pungent, ± glabrous, with 9 or 10 distant *longitudinal nerves* (stomata evident between nerves at ×10 mag.), 3-nerved per face when compressed, 2 nerves flanking the gland on upper surface (often an additional nerve between the two flanking nerves). *Inflorescences* simple; *peduncles* short (3–5 mm long when in flower, to 9 mm in fruit), glabrous; *basal peduncular bract* caducous, cucullate, obtuse; *heads* globular, small (3–4 mm diam. when dry), light golden, 11–18-flowered. *Flowers* 5-merous; *sepals* free or almost so. *Pods* linear, 3–3.5 mm wide, firmly chartaceous, moderately to strongly curved (sometimes into an open circle or coil), glabrous. *Seed* longitudinal in pod.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld] *s. dat., P. Armstrong s.n.* (PERTH 05942497); 11 Nov. 2006, *S. Kern & A. Harris* 12064 (PERTH); 5 Oct. 2005, *R. Meissner & Y. Caruso* 52 (PERTH); 8 Oct. 2005, *R. Meissner & Y. Caruso* 53 (PERTH); 11 Nov. 2005, *R. Meissner & Y. Caruso* 54 (PERTH); 10 Oct. 2005, *R. Meissner & Y. Caruso* 55 (PERTH).

Distribution. Acacia graciliformis is endemic in the northern wheatbelt region of south-west Western Australia (Western Australian Herbarium 1998–). Most collections are from the Koolanooka Hills, east of Morawa, where it occurs as scattered individual plants in moderately dense populations. The species also occurs at the Perenjori Hills located 10 km south-east of the Koolanooka Hills, and part of the same geological structure. There is uncertainty about where the *P. Armstrong* specimen (cited above) was collected: it was gathered either from the Perenjori Hills or from Wanara Station located about 70 km to the east.

Habitat. Grows in reddish brown clay-loam on the slopes and crests of low banded ironstone and laterised banded ironstone hills. The species grows in Woodland and Mallee Shrublands of *Eucalyptus* species (e.g. *E. horistes*, *E. obtusiflora*, *E. salubris* and *E. ebbanoensis*), *Acacia acuminata* and *Allocasuarina acutivalvis*; the understorey vegetation comprises mainly Open Shrubland of *Acacia* species (*A. andrewsii*, *A. acuaria* and *A. erinacea*), *Melaleuca* species (*M. cordifolia*, *M. eleuterostachya* and *M. nematophylla*), *Eremophila clarkei*, *Dianella revoluta* and *Waitzia acuminata* var. *acuminata* (Meissner & Caruso, in review).

Flowering and fruiting period. The paucity of collections makes it difficult to accurately assess the phenology of this species, however, flowering specimens have been collected in mid-September. Judging from these specimens it seems probable that the flowering period would extend from about

Figure 1. Holotype of *Acacia graciliformis* (*B.R. Maslin* 9100), scale = 5 cm.

August to October. Immature pods occur in early October and it is probable that mature seed would be present around mid-November.

Conservation status. Acacia graciliformis has recently been listed as a Priority One species according to DEC Conservation Codes for Western Australian Flora.

Etymology. The botanical name is derived from the Latin *gracilis* (slender, thin) and *forma* (shape) in reference to the species' characteristically slender phyllodes.

Common name. Koolanooka Delicate Wattle (suggested new common name). For derivation of the name 'Koolanooka' see *Common name* under *Acacia muriculata* below.

Affinities. Acacia graciliformis is referable to *Acacia* sect. *Plurinerves* (Benth.) Maiden & Betche and is a member of the "*Acacia densiflora* Group" (Cowan & Maslin 1995: 206–221). It appears most closely related to the two widespread wheatbelt species, *A. mackeyana* Ewart & Jean White and *A. dissona* R.S.Cowan & Maslin, which differ significantly from the new species in their phyllode nervature (nerves closely-spaced and 20 or more per phyllode). *Acacia dissona* is further distinguished by its straight, generally longer (20–40 mm long) phyllodes, more densely hairy branchlets (at least toward their apices) and narrower pods (to 2.5 mm wide). *Acacia mackeyana* is further distinguished from *A. graciliformis* by its densely tomentulose branchlets, thicker (1–1.5 mm) phyllodes with raised stomata between the nerves and narrower (2–2.5 mm wide) pods which are more thickly textured (crustaceous) and less prominently curved. *Acacia graciliformis* is more distantly related to *A. declinata* R.S.Cowan & Maslin which differs most obviously in having wide-spreading to retrorse branchlet hairs, straight, 8-nerved phyllodes and undulate pods; *A. declinata* is restricted to a small area on the south coast of Western Australia near Albany, some 750 km to the south of the Koolanooka Hills.

Acacia muriculata Maslin & Buscumb, *sp. nov.*

Fruticuli 1–2 m alti. *Ramuli* in costas verruculosi, pilis longis saepe caducis ad basim tuberculatis. *Stipula* 2–4 mm longa, saepe tantum basis induratis incrassatis persistentibus. *Phyllodia* plerumque anguste oblonga vel oblongo-elliptica, (20–)25–45 mm longa, (4–)6–10 mm lata, coriacea, plerumque vadose ad valde recurva; costa prominens, sparse pilosa; nervus marginalis prominens, verruculus pilis saepe caducis ad basim tuberculatis. *Inflorescentiae* in surculos novos mobiliter crescentes initiatae, racemis simplices vel rudimentalibus 1–2-capitatis; *pedunculi* 10–18 mm longi, glabri, rubri; *capitula* globularia, pallido aurea, dense 26–50 flora, grandia (5–9 mm diam. in sicco). *Flores* 5-meri; sepala brevissima, longitudine *c.* 1/5 petalii partes aequantia, ± libra; *petala* ad apicum atro-brunnea suffusa (in alabastro plerumque manifesta), enervata, glabra.

Typus: Koolanooka Hills, east of Morawa, Western Australia [precise locality withheld for conservation purposes], 13 September 2006, *B.R. Maslin* 9104 (*holo*: PERTH 07489374; *iso*: CANB, K, MEL, NSW, NY, PERTH 07489366).

Acacia sp. Koolanooka falcate (*R. Meissner & Y. Caruso* 84), Meissner and Caruso (in review).

Photographs. WorldWideWattle [online at www.worldwidewattle.com].

Intricately-branched, multi-stemmed spreading *shrubs* 1–2 m tall with rigid branches. *Branchlets* terete except often slightly angled at extremities, verruculose-ribbed by tubercle-based, often caducous

hairs (the ribs yellow but aging brown), pilose mainly on the ribs, becoming glabrous with age, stomata evident between ribs (at ×10 mag.), marked with raised stem projections where phyllodes have fallen. *New shoots* maroon-red or dull brown tinged maroon (drying dark brownish), shiny but aging dull, sparsely pilose. *Stipules* narrowly triangular, 2–4 mm long, dark brown, variably hairy on margins, often only the thickened, indurate bases persisting (as innocuous or sub-pungent projections) at mature nodes. *Phyllodes* mostly narrowly oblong to oblong-elliptic, (20–)25–45 mm long, (4–)6–10 mm wide (larger on juvenile plants), coriaceous, rather wide-spreading, normally shallowly to markedly recurved but sometimes interspersed with a few that are straight and dimidiate (i.e. lower margin ± straight and upper margin shallowly convex), stomata visible (at ×10 mag.), dull, sub-glaucous (? aging green); prominently 1-nerved by a raised, yellowish *midrib* which is ± sparsely pilose (hairs tubercle-based), normally becoming glabrous with age; lateral nerves somewhat obscure and diverging from midrib at a very wide angle; *marginal nerve* prominent, yellow, verruculose by tubercle-based, often caducous hairs as on branchlet ribs; *apices* obtuse, sometimes (on the smaller phyllodes) ± acute, eccentrically mucronate with the innocuous or coarsely pungent brown tip, straight or slightly up-turned; *pulvinus* not well developed (*c.* 0.5 mm long), yellowish. *Gland* seemingly absent. *Inflorescences* initiated on actively expanding new shoots, sparse on plant, simple or rudimentary 1–2-headed racemes, 1–2(–6) mm long; *peduncles* 10–18 mm long, glabrous, red; *basal peduncular bract* single and persistent; *heads* globular, large (5–9 mm diam. when dry), light golden, densely 26–50 flowered. *Bracteoles* linear-spathulate, *c.* 0.6 mm long, laminae dark brown (when dry) and sparsely ciliolate. *Flowers* 5-merous; *sepals* 0.5–0.7 mm long, *c.* 1/5 the length of petals, ± free, narrowly oblong to linear-spathulate, brown; *petals* oblanceolate, 2.5–3.2 mm long, *c.* 2/3–3/4 united, the free portions not recurved following anthesis, tinged dark brown at apex (most obvious in buds), nerveless, glabrous; *ovary* glabrous, *c.* 1.2 mm long. *Pods* and *seeds* not seen. (Figure 2)

Characteristic features. Intricately-branched, multi-stemmed *shrubs* 1–2 m tall. *Branchlets* verruculose-ribbed by tubercle-based, often caducous hairs, pilose mainly on the ribs. *New shoots* maroon-red or dull brown tinged maroon. *Stipule* 2–4 mm long, often only the thickened, indurate bases persisting at mature nodes. *Phyllodes* mostly narrowly oblong to oblong-elliptic, (20–)25–45 mm long, (4–)6–10 mm wide, coriaceous, mostly shallowly to markedly recurved, sub-glaucous (? aging green); *midrib* prominent, ± sparsely pilose (hairs tubercle-based) but normally becoming glabrous with age; *marginal nerve* prominent and yellow, verruculose by tubercle-based, often caducous hairs as on branchlet ribs. *Inflorescences* initiated on actively expanding new shoots, simple or rudimentary 1–2-headed racemes; *peduncles* 10–18 mm long, glabrous, red; *heads* globular, light golden, densely 26–50 flowered, large (5–9 mm diam. when dry). *Flowers* 5-merous; *sepals* 0.5–0.7 mm long, *c.* 1/5 the length of petals, ± free; *petals* tinged dark brown at apex (most obvious in buds), nerveless, glabrous.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld] 13 Sep. 2006, *B.R. Maslin* 9105 (PERTH); 12 Oct. 2005, *R. Meissner & Y. Caruso* 84 (PERTH); 12 Oct. 2005, *R. Meissner & Y. Caruso* 85 (PERTH); 10 Oct. 2005, *R. Meissner & Y. Caruso* 86 (PERTH); 9 Oct. 2005, *R. Meissner & Y. Caruso* 88 (PERTH).

Distribution. Acacia muriculata is endemic in the northern wheatbelt region of south-west Western Australia where it is known only from the Koolanooka Hills east of Morawa (Western Australian Herbarium 1998–). It has a scattered, discontinuous distribution within the Hills and occurs at relatively low frequencies in the places where it is found (Meissner & Caruso, in review).

Habitat. Grows in skeletal gravelly loam on the middle to upper slopes (occasionally lower slopes) of low hills of banded ironstone and laterised banded ironstone (Meissner & Caruso, in review). It occurs in Mallee Shrublands of *Eucalyptus ebbanoensis*, *Allocasaurina acutivalis* subsp. *prinsepiana*

Figure 2. Holotype of *Acacia muriculata* (*B.R. Maslin* 9104), scale = 5 cm.

and *Melaleuca atroviridis* with an understorey of Open Shrubland comprising of *Acacia nigripilosa* subsp. *nigripilosa*, *Hibbertia exasperata* and *Waitzia acuminata* var. *acuminata* (Meissner & Caruso, in review).

Flowering and fruiting period. Flowers in September and October may possibly extend to November. Fruiting specimens have not been seen but mature pods may possibly occur between December and January.

Conservation status. Acacia muriculata has recently been listed as a Priority One species according to DEC Conservation Codes for Western Australian Flora.

Etymology. The botanical name is derived from the Latin *muriculatus* (roughened by very short, hard tubercular excrescences) in allusion to the characteristic verruculose margins of the phyllodes.

Common name. Koolanooka Wattle (suggested new common name). This common name refers to the hills to which the species is confined. The name ' Koolanooka' means 'hill of wild turkeys' in the local aboriginal dialect (Rogers 1996).

Affinities. Acacia muriculata is referable to *Acacia* sect. *Acacia* and is very distinctive on account of its verruculose-ribbed branchlets (ribs often pilose), strongly 1-nerved, relatively wide, recurved, coriaceous phyllodes with prominently verruculose margins, sub-persistent stipules (indurate at base), large flower heads, very small ± free sepals and united petals which are tinged dark brown at their apices. In the absence of pods it is difficult to be certain of its affinities, however, judging from vegetative and inflorescence characters *A. muriculata* may be allied to *A. aculeiformis* Maslin and *A. botrydion* Maslin, both of which are readily distinguished by their differently shaped phyllodes which are much shorter (10–25 mm long in *A. aculeiformis*, 9–15 mm long in *A. botrydion*). *Acacia aculeiformis* (whose northern-most occurrence is at Three Springs, 55 km SW of Koolanooka Hills) is further distinguished by its spinose, recurved stipules and its sepals which are about half the length of the scarlet-tinged petals. *Acacia botrydion* (endemic to the Wongan Hills, 160 km SSE of the Koolanooka Hills) is further distinguished by its coarsely pungent branchlets which are often devoid of phyllodes, denser heads, consistently racemose inflorescences (racemes 5–20 mm long) and sepals which are two thirds the length of the petals.

Variation. The phyllodes are somewhat variable in size. On mature plants they are normally 25–45 mm long and 6–10 mm wide, however, it is not uncommon to find these interspersed with a few smaller ones (*c.* 20 mm long and 4–6 mm wide), especially towards the ends of branchlets where the inflorescences are formed. The phyllodes of juvenile plants are considerably larger than those of the adults, reaching 65–70 mm long and 12–20 mm wide.

Notes. A little regeneration on recently cleared survey lines was observed by the first author in late 2006.

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